NATURAL RESOURCES CONSERVATION SERVICE
MISSOURI CONSTRUCTION SPECIFICATION

FOR

REINFORCED CONCRETE

(750)

Scope

Work shall consist of furnishing all labor, equipment and materials needed to construct the concrete structure as shown on the drawings. Construction shall be in a manner that erosion will be minimized and held within tolerable limits. The completed job shall be workmanlike and present a good appearance. Materials and fabrication shall be as specified herein or on the drawings.

Concrete Mix

The water-cement ratio shall be 5-1/2 to 6 U.S. gallons of water per 94-pound sack of cement. A minimum of 6 bags of cement per cubic yard of concrete shall be used. The proportions of ingredients for the trial mix shall be 1:2:3-1/2 (cement: fine aggregate: coarse aggregate), measured by weight. The combination of aggregates may be adjusted to produce a plastic and workable mix that will not produce harshness in placing or honeycombing in the structure. The design mix used shall have a minimum 28-day compressive strength of 3,500 psi. Other design mixes may be used when strength is verified by tests from a competent testing laboratory.

Cement

Portland Cement shall meet the requirements of ASTM C150. Type I or IA (air entrained) will normally be used for construction. Concrete will be air entrained and the air content shall range from 5 to 8 percent.

Water

Water used in mixing concrete should be fresh potable water.

Aggregates

Fine and coarse aggregates shall conform to the provisions of ASTM C33. The maximum size of the coarse aggregates shall be 1-1/2 inches. Clay lumps may not exceed 3 percent aggregate weight. All crushed stone or gravel used for coarse aggregate should be clean and hard. Size number 57 will normally be used for coarse aggregate. Other gradations may be specified as long as they conform to the gradation table in ASTM C33.

Ready Mixed Aggregate

All ready mixed aggregate should consist of a uniformly graded mixture of sand and gravel (or crushed stone) of such composition that if separated on a No. 4 sieve the amount retained would be 50 to 67 percent. Material passing the No. 4 sieve should conform to requirements listed for Fine Aggregate and material retained on the No. 4 sieve should conform to requirements listed for Coarse Aggregate as shown in ASTM C33.

Mixing

Mixing time will be the minimum as necessary to obtain a uniform distribution of materials so the mass is uniform and homogeneous.

Transporting

When ready mix concrete is used, the driver should supply a copy of the delivery ticket showing the quantities of cement, fine aggregate, coarse aggregate, and water in the mix and the time the water was added to the mix.

Conveying and Placing

Concrete should be conveyed from the mixer or delivery truck as rapidly as possible. When chutes are used, the concrete should flow as nearly continuous as possible. There shall be no vertical drop of over five (5) feet unless suitable equipment is used to prevent segregation.

Concrete shall be placed within 1-1/2 hours after the introduction of the water to the cement and aggregates. Placement time may be extended when an approved set retarding admixture is used. Concrete shall be deposited within 8 feet of its final position in the forms. Slump of concrete shall not exceed 5 inches. Concrete shall be consolidated by use of a vibrator. Hand spading and rodding may be used if approved. Concrete shall have a finish appropriate to its intended use.

When earth foundations are used, all concrete shall be placed upon clean, damp surfaces free from frost, ice, or standing or running water.

Reinforcing Steel

Steel bar reinforcement shall conform to the requirements of ASTM Specification A615 Grade 40 or 60.

All reinforcing steel shall be shop bent by the supplier or fabricator in compliance with the requirements of the American Concrete Institute Standard 315, prior to delivery to the site, unless otherwise shown. Radius of bar bends shall equal 3 bar diameters.

All reinforcing steel shall be free of dirt, rust, scale, oil, paint, and any other undesirable coating. The steel shall be accurately placed and securely tied and blocked into position. Metal chairs, metal hangers, metal spacers, and concrete chairs may be used to support the reinforcement. Metal hangers, spacers, and ties shall be placed in such a manner that they will not be exposed in the finished concrete surface. Rocks or bricks shall not be used. Blocks shall be removed during placement of concrete.

Bar splices shall overlap at least 30 bar diameters, or as specified on the drawings. Minimum cover over all steel reinforcement shall be 2".

Steel placement shall be inspected prior to each concrete pour.

Forms

All concrete shall be placed in properly constructed forms, except that natural ground or rock may be used as forms when approved in advance by the Engineer. Forms shall conform to the shape, lines, and dimensions of the structures as indicated on the drawings. They shall be sufficiently tight to prevent leakage of mortar and shall be properly braced or tied together so as to maintain position and shape. Before placing concrete the forms shall be oiled with suitable nonstaining oil. Excess oil or other harmful substance shall be removed prior to setting of forms in place. Care shall be taken to keep oil from reinforcing steel or concrete surfaces where additional concrete will be placed.

Form ties shall be equipped with cones to permit their removal to a depth of one inch unless otherwise approved.

Forms shall be inspected prior to each concrete pour.

Construction Joints

When the placing of concrete is to be interrupted long enough for the concrete to take its final set, the joint shall be formed as shown on the drawings. Immediately before placing concrete against any construction joint the surface shall be thoroughly cleaned in such a manner as to remove all foreign particles and loose or defective concrete. The joint shall be wet and washed clean and all excess water removed from depressions before new concrete is placed. The inplace concrete shall cure a minimum of 12 hours prior to placement of new concrete.

Removal of Forms

Forms shall not be removed for 24 hours during summer weather or 48 hours during winter weather to insure the complete safety of the structure. After removing forms, surface defects such as honeycomb, and damages by form removal shall be repaired with a cement mortar consisting of one part cement to two parts sand by volume. Exposed rough places on the concrete caused by excessive mortar leakage or patching shall be removed and rubbed level with the surrounding surface.

Curing

All concrete shall be cured for at least 5 days. The curing process should be done so as to keep the concrete moist. Acceptable methods are continuous spray, ponded water, continuously saturated burlap, sand, straw, or other absorbent material. A membrane may be sprayed on the surface or a plastic film may be used to prevent loss of moisture. Curing compound if used shall conform to ASTM C309. Curing compound shall be applied as recommended by manufacturer. Curing compound shall not be used on surfaces that will receive additional concrete. Water should be applied on unformed surfaces as soon as water will not erode the cement or damage the finish, and on formed surfaces immediately after the forms are stripped. Concrete shall not be exposed to freezing temperatures during the curing period. Temperature of concrete during placement and curing period shall be maintained between 40 and 90 degrees (F).

Backfilling

Backfill should not be placed against new concrete until the expiration of the minimum period after placing concrete as indicated below:

Floor, Cradle or Bedding ---------- 2 days
Walls, etc.---------- 7 days

Additional details:_____

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